

Flystrike

Livestock Booklet



WHAT IS FLYSTRIKE?

Flystrike is a disease affecting sheep which is caused by flies. Flystrike is a serious animal welfare issue and also has a significant economic impact, costing the Australian sheep industry \$280 million a year. This includes chemical costs; labour and time required to clear infection and production losses such as decreased wool value and sometimes death.

Flystrike emerges when seasonal conditions provide heavy rainfall and warm temperatures, with the flystrike season taking place in wet summer months. Flystrike occurs when the causative fly feeds off damaged skin caused by urine, diarrhoea or by the continual wetting of fleece resulting in a condition known as fleece rot.

THE AUSTRALIAN SHEEP BLOWFLY

Lucilia cuprina, commonly known as the Australian sheep blowfly is the major species causing problems for Victorian sheep producers. The small shiny green fly is responsible for over 90% of flystrike incidences. The fly lays its eggs on the fouled wool of living sheep or in fresh carcasses, with the eggs taking eight to thirty-six hours to hatch. Eggs will only hatch if their environment remains warm and moist, drying out will kill the eggs. Once they hatch, the maggots move along the skin on a live sheep.



Young maggots are kept alive by living off “weeping” fluid that is excreted from skin disturbed by fleece rot or irritated by urine or diarrhoea. The maggots feed off this fluid for three to four days before dropping off the sheep, usually at night. The maggots then burrow into the soil and provided warm conditions continue, maggots undergo physical change and move into their next life cycle stage known as pupation. This occurs 2 to 3 days after the maggots drop from the sheep. In warm weather the pupal stage can be as short as 6 days or as long as 25 days in cooler weather.

When the maggots develop into adults, the females require protein to develop their eggs. Protein is sourced from flystruck sheep or sometimes manure, with the female laying her eggs 3 to 4 days after emerging from puparium.

The lifecycle of *L. cuprina* is generally completed in 17 days with the fly normally only travelling a distance of 1-2km in their lifetime. Therefore, most flystrike incidents occur on the property where they were bred. Thus, a strategic flystrike management plan is vital to keep fly numbers down.

TYPES OF FLYSTRIKE

There are various types of flystrike which can occur on a sheep. Breech strike and body strike are the most production-limiting types affecting Victorian producers. Flystrike can occur at various locations on sheep, including:

- Breech strike; taking place around the crutch area of the sheep, due to urine and faecal stains causing skin irritation and the weeping of fluids, providing a protein source for flies.
- Body strike; fleece infected with fleece rot or other forms of bacterial stain.
- Wound strike; a protein-producing moist area caused by any type of wound to the skin e.g. footrot or marking.
- Pizzle strike; scalding of skin and weeping fluid around the pizzle cause by urine stained wool.
- Poll strike; affecting the base of horns in rams or wethers as a result of wounds or sweat.

IS MY FLOCK SUSCEPTIBLE?

All breeds of sheep are vulnerable to flystrike during wet seasons. Conditions such as fleece rot or dermatophilosis ('lumpy wool') are predisposing factors for flystrike. Dermatophilosis causes scabs to form along the back of the animal that move outwards with growth of the wool, forming hard lumps along the wool staples.

Fleece rot occurs when:

- There is continual wetting of fleece, without drying promotes bacterial growth.
- The crusty fluid produced by the bacterial growth, causes knotted wool fibres next to the skin.
- The fleece will often look discoloured, often looking green, yellow, brown, grey or red orange in colour.
- Fleece rot is only diagnosed when discolouration exists with the crusty bacterial growth.

Environmental factors that increase the incidence of flystrike include:

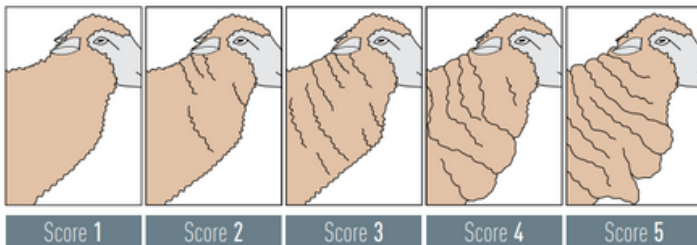
- Daily temperatures above 17°C or higher
- Steady or intermittent rain over a number of days, as it provides favourable moist conditions for the fly and encourages fleece rot.
- Moderate to low wind speeds, as fly numbers increase as wind velocity decreases.



BREEDING FOR FLYSTRIPE RESISTANCE

Commercial producers are able to select specific traits for breeding, which decreases the risk of flystrike in the flock. This reduces the susceptibility of sheep by concentrating on the traits that predispose sheep to breech strike (wrinkle and dag) and body strike (fleece rot).

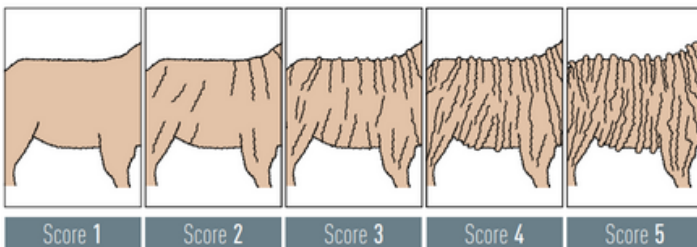
NECK WRINKLE (NKNR)



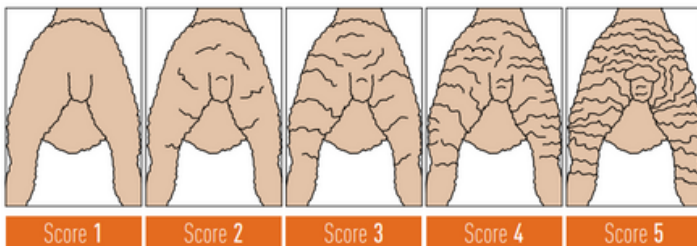
When breeding for breech strike resistance, producers should focus on factors including:

- Amount of wrinkle around the breech (crutch) of the ram or ewe when selecting breeding stock.
- Select sheep that have a low visual wrinkle score (1 or 2) or have low breech score breeding values (Figure 1).
- In some cases it may be hard to establish a visual breech score such in sheep that have been mulesed. Producers should then look at the amount of wrinkle on the neck and body.

BODY WRINKLE (BDWR)



BREECH WRINKLE (BRWR)



When breeding for body strike resistance, producers should aim to score sheep for fleece rot (figure 2).

Figure 1. Visual sheep wrinkle scores (source: Australian Wool Innovation)

General principles for fleece rot scoring include:

- Opening the fleece along the backline at four points.
- Look for indications of staining and bands of crusting at the back of the neck, wither, loin and the rump.
- At each of these sites, the fleece should be opened not only along the backline, but on both sides of the sheep roughly 10cm from the midline.
- At each site producers should give a score based on the amount of discolouration or crusting of fleece.
- The higher the score, the more fleece stain and crusting.
- Each animal should be given an overall score based on the highest score recorded among the four sites. For example if an animal receives site scores of 2, 1, 2, 4 then the overall fleece rot score for that sheep is 4.
- Young sheep carrying 4 to 12 months wool growth are most susceptible to fleece rot. Scoring should be conducted on these animals first and replacement breeders selected.

It is up to the discretion of producers how much selection pressure they put on these two traits comparative to other production traits. Producers should assess their current flystrike risk and determine their breeding objectives for the future. If a flock is considered a high risk for flystrike producers may decide to cull a percentage of sheep in the mob that contribute to flystrike such as animals with high wrinkle and fleece rot scores. This may only be a small number of sheep, depending on what is most practical for your business. Eliminating these sheep and breeding from selected sheep with lower scores will help introduce a level of future resistance into the flock.

FLEECE ROT (FLROT)

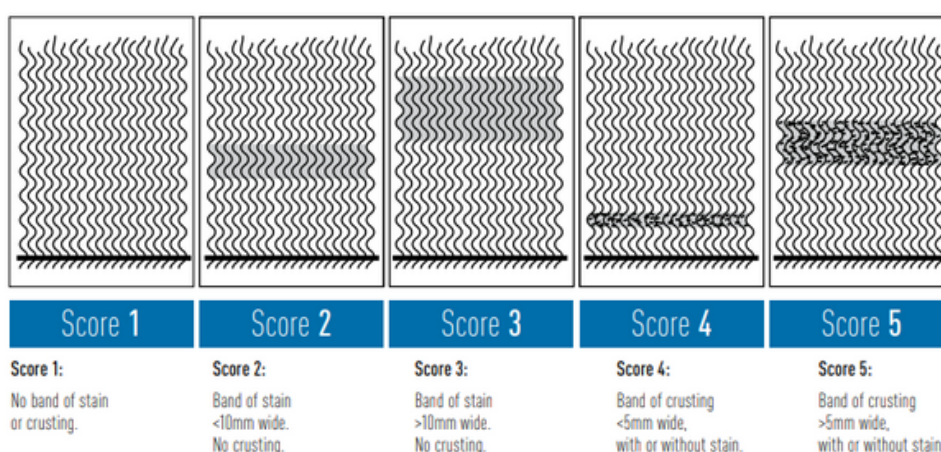


Figure 2. Fleece rot scores (source: Australian Wool Innovation)

TREATMENT

Treating flystruck sheep is essential. If struck sheep are left untreated or incorrectly treated then sheep can suffer significant stress, produce tender wool, become vulnerable for restrike by a secondary blowfly species or death may occur. During periods of high risk it is important to check susceptible stock regularly. Often by the time flystruck sheep are found the maggots have completed their development. These maggots must be killed to stop them from becoming the next generation of blowflies that cause strike.

General principles for treating flystruck sheep include:

- Removal of struck wool. Clipping the wool allows for the infected skin to dry out as well as exposing maggot trails.
- Clipping should extend 4-5cm into clean wool to ensure all maggot trails have been exposed.
- Clipped wool should be placed in a plastic bag, sealed and left to dry out in the sun, thus killing the maggots.
- Dressing should be thoroughly applied to the infected area using a registered chemical (figure 3). This prevents the area from being restruck while it is healing.

Group	Chemical	Application Method				Raw Wool Residue	Human Health Risk	Resistance
		Spray-On	Jetting	Dipping	Dressing			
Spinosyn	Spinosad	No	Yes	Yes	Yes	Low	Low	No
Macrocyclic Lactones (ML)	Ivermectin	No	Yes	No	Yes	Low	Low	No
Organophosphate (OP)	Diazinon	No	No	No	Yes	Low-Medium	High (Diazinon products)	Yes
Insect Growth Regulators (IGR)	Dicyclanil	Yes	No	No	No	Medium in long wool >6 weeks post shearing	Low	No
	Cyromazine	Yes	Yes	Yes	Yes			
Synthetic Pyrethroids (SP)	Alpha-cypermethrin	Yes	No	No	No	High in long wool >6 weeks post shearing	Medium	No

Figure 3. Chemical groups registered for treatment against Flystrike (source: DPI NSW & Flyboss).

PREVENTION

Although there are uncontrollable factors such as air temperature and wind speed contributing to flystrike there are some controllable management options farmers can utilise to lower the risk. These options include:

- Spraying, jetting or dipping high risk mobs with preventative chemicals (figure 3). Weaners, ewes about to lamb and those with a frequency of fleece rot should get preferential treatment. Producers should always handle and store products in accordance with label instructions.
- If a preventative chemical is not used, sheep should be inspected every two days during high risk periods.
- Apply a range of husbandry practices to manage dag and flystrike risk such as shearing, mulesing, crutching, worm control and nutrition practices (to bind faecal material).
- Mulesing is an option for flystrike prevention and involves permanently removing wool around the breech area of the sheep.
- It is up to the discretion of the producer if mulesing is to be carried out. The procedure should be done with best practice and animal welfare in mind.

SPRAY-ON PREVENTION

There are a number of commercially available products for preventing flystrike using a spray-on method. This method is often easier and more convenient compared to other methods such as hand jetting and dipping. Spray-on chemicals usually don't require dilution with water, so they may be taken to the sheep rather than reliance on yards with access to large volumes of water. These products can be applied with the assistance of powered applicators such as compressed air, which allows for even delivery, rapid refilling of applicator guns and reduced operator fatigue. Products may also be applied using easily portable manual squeeze guns. This method is often cheaper and more convenient, however may be only practical in smaller flocks.

General application principles for spray-on chemicals include:

- Spraying the sheep evenly along the backline from poll to tail and equally along each side of the spine.
- Holding the applicator gun 20-25cm above the animal when applying the chemical.
- In high-risk mobs sheep may be sprayed around the breech area for extra protection.
- Producers should aim for complete coverage of these areas to ensure effective protection against strike.
- For products requiring dosage based on body weight, dose should be given based on the heaviest animal in the mob.

- Products requiring dosage based on wool length, should be calibrated based on the longest wool length in the mob.
- Spray-on products are only effective on sheep that have not been struck or don't have daggy crutches.
- Flystruck sheep should be drafted from the mob and treated accordingly.
- Daggy sheep should be crutched, removing soiled areas before treatment.

JETTING

Hand jetting sheep with preventative chemicals is often a slow process requiring access to copious amounts of water, appropriate infrastructure such as a concrete-floored race with adequate drainage, protective clothing and proper jetting equipment. Correct hand jetting offers effective protection however due to the laborious nature of the process, operator fatigue is common, often affecting the performance of the product due to incorrect application. Producers should take their time to apply the product properly and select a product offering long-term protection.

Points to consider when hand jetting include:

- Wearing appropriate protective equipment when mixing jetting fluid and jetting sheep.
- The operator should wet along the backline of the animal from poll to tail.
- Apply product to either side of the spine, overlapping the backline spray.
- When jetting, the nozzle of the jetting wand must be held in the fleece to ensure the product reaches the skin.
- The aim of hand jetting is to drench the whole staple so the product reaches the skin where maggots feed.

- In longer wool a few passes along each area may be required to ensure sufficient soaking of the skin.
- As a general rule, apply 0.5L of jetting fluid per one month of wool growth.
- Certain dyes such as Permicol Blue may be used to identify sufficiently wetted areas.
- Rams and wethers may require jetting to the pizzle area to protect against pizzle strike.
- Horned rams should be jetted around the poll area to prevent strike from fighting wounds.
- Susceptible sheep may need to be hand jetted around the breech area, over the tail and up the inside of the hind legs from hock upwards for extra protection.

DIPPING

There are three types of dipping methods that can be used for prevention against flystrike. These include shower dipping, plunge dipping and cage dipping. Regardless of dipping method, there are several general dipping principles that should be followed such as:

- Allowing sheep to 'empty out' before dipping. Sheep should be held in yards overnight with access to water only.
- Dipping equipment should be in good working order and thoroughly clean before commencing treatment.
- Sheep must be carrying a minimum of 6 weeks wool growth to retain sufficient flystrike protection when using cyromazine products.
- Sheep should not be dipped in cold, windy weather or in poor condition, weak or if severely struck.
- Heavily pregnant ewes should not be plunge or cage dipped.
- Do not dip through muddy yards.
- Sheep should not be held in yards after dipping.

SHOWER DIPS

- Dip solution must soak through to skin level to offer optimum protection.
- Sheep with longer wool should remain in the shower for longer to ensure sufficient wetting is achieved.
- Shower dipping is often an inefficient method as it uses more solution than hand jetting and fleece will retain higher residues.
- Shower dips are best used in situations where rapid treatment of sheep is required and there is a labour shortage.
- A closed-in exit gate is recommended for a more even distribution of sheep in the shower, improving animal welfare and wetting efficiency. Mesh gates can adversely affect wetting efficiency when sheep crowd at the exit gate.
- Side walls should be sufficiently extended to protect operators from spray drift.
- Time required in the shower dip will vary depending on sheep numbers and wool growth. Generally a minimum of 12 minutes in a shower dip can be observed.
- Assess the ability of sheep to climb out of the plunge dips in relation to wet fleece weight. Sheep with heavy fleeces may struggle and be slower moving out of the plunge dip. Care should be taken to avoid pileups.
- Sheep should run around a bend into the dip to achieve separation and ensure even distribution of solution.
- The number of sheep that can run through the dip before it needs to be cleaned is based on the general rule of one sheep for per 2 L of dip wash, based on the full volume of the dip. For example, when using a 5000 L capacity dip, 2500 sheep can go through the dip, before it should be emptied and refilled.
- Operators should wear appropriate protective equipment such as waterproof trousers and boots.

PLUNGE DIPS

- There are in-ground plunge dips and mobile plunge dips requiring manual sheep dunking.
- Plunge dipping can be a wasteful application method using more solution than hand jetting or spray on chemicals.
- Fleece will retain higher cyromazine chemical residues when dipping.
- The dip should be deep enough so that the sheep must swim at all times.
- Flow of stock into the dip needs to be controlled. Collisions can slow the process down often resulting in some sheep not being sufficiently dunked.
- There are a number of cage dipping machines used in Australia.
- Sheep are drafted into the cage and then the cage is lowered into the dip with the sheep fully submerged for a very short time.
- System can be very effective allowing even distribution of product.
- Cage dips can be an efficient method as the hydraulic operation reduces the labour required to conduct the dipping process and most operations are capable of treating in excess of 2000 sheep per day with just one to two people.
- Only strong, healthy sheep should be selected for this treatment. Producers should avoid cage dipping sheep that are weak and in poor condition.



FURTHER LINKS

Department of Primary Industries Victoria

1 <http://www.dpi.vic.gov.au/agriculture/beef-and-sheep/sheep/sheephealth-and-welfare/flystrike>

2 <http://www.dpi.vic.gov.au/agriculture/pests-diseases-and-weeds/pestinsects/ag0081-sheep-blowflies-in-victoria>

Department of Primary Industries New South Wales

1 <http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/chemicals-lice-flystrike>

2 http://www.dpi.nsw.gov.au/data/assets/pdf_file/0016/300472/9096-Treating-flystruck-sheep---Primefact-845.pdf

3 http://www.dpi.nsw.gov.au/data/assets/pdf_file/0012/258888/Triggers-leading-to-blowfly-strike.pdf

SheepCRC- Flyboss

www.flyboss.org.au

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